

NASA EARTH EXCHANGE IN SUPPORT OF THE NATIONAL CLIMATE ASSESSMENT

NASA Advanced Supercomputing/Earth Science Division

NASA Ames Research Center

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NASA EARTH EXCHANGE (NEX)

OVERVIEW

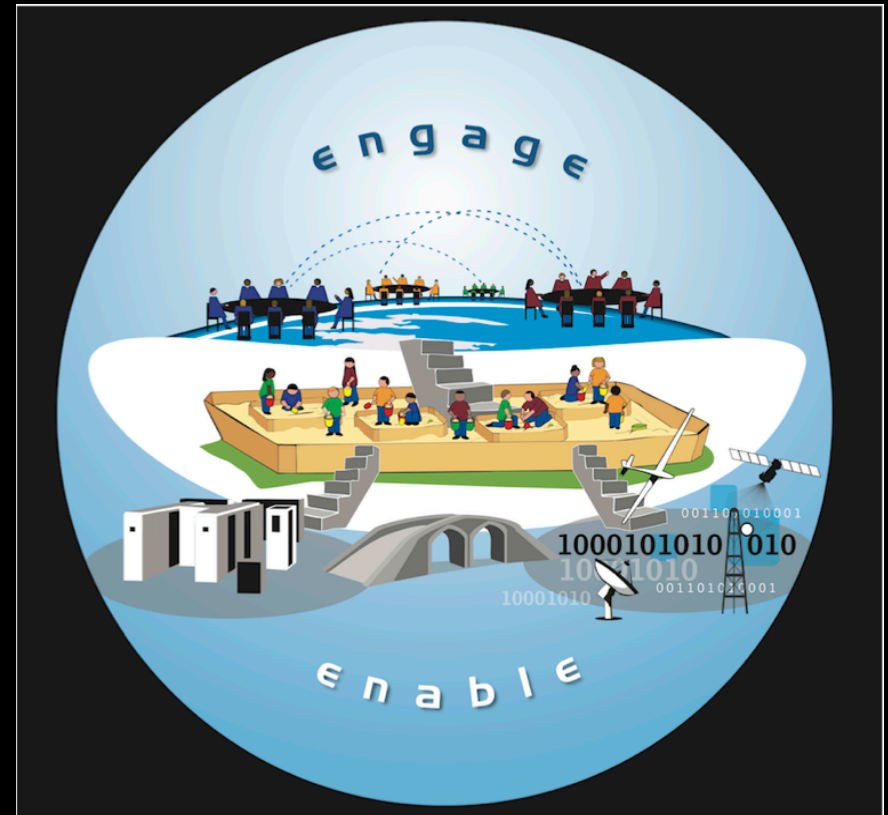
+ NEX is virtual collaborative that brings scientists and researchers together in a knowledge-based social network and provides the necessary tools, computing power, and data to accelerate research, innovation and provide transparency.

VISION

To provide “**science as a service**” to the Earth science community addressing global environmental challenges

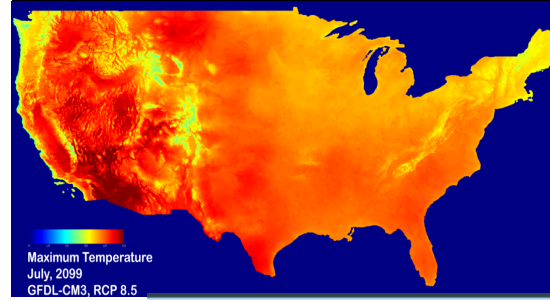
GOAL

To improve efficiency and expand the scope of NASA Earth science technology, research and applications programs

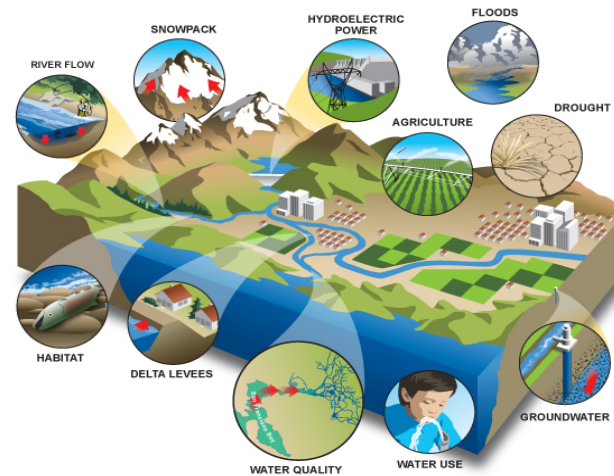
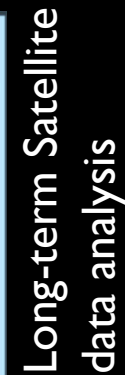


Every 4 years

Climate modeling



Downscaling



Modeling impacts

NCA@NEX Objectives

- **Develop high resolution climate projections data.**

Empower the community for creating a high resolution downscaled climate projections data set useful for climate impact assessments.

- **Develop climate change indicators and monitoring:**

Analysis of long-term satellite data for the U.S. to quantify spatial and temporal patterns in indicators of terrestrial ecosystem condition.

- **Facilitate climate impacts modeling:**

Facilitate ensemble modeling experiments to quantify changes in biogeochemical cycling in response to changes in climate as well as land use.

NEX Resources available to the community

Data sets:

- 35 CMIP5 model outputs
- 30 yr AVHRR (1981-2011)
- 1972-2012 Landsat (over 1.8 million scenes)
- 800m Downscaled CMIP5 data (NEX-DCP30)

Models (used by the NEX community):

Biome-BGC	CAM/CCSM	TM5
LPJ	WRF	STILT
TOPS-BGC	RAMS	WRF/CHEM
VIC	ROMS	
RegCM		

Tools

- UV-CDAT visualization
- VisTrails workflow management
- R, Python, Matlab, IDL, ...

Community Engagement

Academic Institutions

1. Walter Jetz, Yale University
2. Andy Hansen, Montana State U
3. Y.Q. Yang, U of RI
4. R. Waring, Oregon State
5. Steve Running, U of Montana
6. Scott Geotz, WHRC
7. Debbie Huntzinger, U of Northern Arizona
8. John Kimball, U of Montana
9. Ranga Myneni, Boston U
10. Sam Goward, U of Maryland
11. Ed Maurer, Santa Clara U
12. Randy Wynne, Virginia Tech
13. Balaji Rajagopalan, U of Colorado
14. Jonathan Overpeck, U of Arizona
15. Dan Cayan, Scripps Inst. Of Oceanography
16. Larry Band, U of North Carolina
17. David Roy, South Dakota State U.
18. Ralph Keeling, Scripps Inst. Of Oceanography

Federal Agencies/labs



19. USGS, Jeff Morisette, Prasad T.
20. NOAA, Marty Hoerling, Eric Danner, Mark Eakin
21. NOAA/ESRL, Andy Jacobson
22. USBR, Levi Brekke
23. USFS, Warren Cohen, Jessica Haas
24. EPA, Don Hodge
25. USFWS, Tom Oliff
26. CASI team, Cristina Milesi
27. NPS, John Gross
28. LLNL, Phil Duffy

Non-Profit

29. Climate Central, Bridget Thrasher
30. Cal Academy of Sciences, Healy Hamilton
31. John Musinsky, Conservation Int.

DCP30 Dataset Picked up by USGS!

(http://www.usgs.gov/climate_landuse/clu_rd/nex-dcp30.asp)



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Climate and Land Use Change Research and Development Program

Climate and Land Use Change Home

R&D HOME
CURRENT RESEARCH THEMES:
Abrupt Climate Change
Carbon Cycle - Processes Influencing Carbon Flux
Climate Data and Model Integration
Distinguishing Natural Climate Variability from Anthropogenic Climate Change
Hydrologic Extremes: Patterns, Causes, and Impacts
Impacts of Climate and Land Use Change on Terrestrial and Marine Systems
Rates, Causes, and Consequences of Land Use and Land Cover Change
Sea Level Rise and Coastal Regions
PROJECTS
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NEX-DCP30 Home

[Home](#) | [Data Viewer](#) | [Tutorial](#) | [Dataset](#) | [Methods](#) | [Updates](#)

02-24-2014: The web application has been updated to provide both English and metric units

Worldwide climate modeling centers participating in the 5th Climate Model Intercomparison Program (CMIP5) are providing climate information for the ongoing Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC). The output from the global climate models is typically provided on grids on the order of ~1 to 3 degrees in latitude and longitude (roughly 80 to 230 km at 45°latitude). To derive higher resolution data sets from the global models, NASA has downscaled the CMIP5 model temperature and precipitation data using statistical methods to produce the **NEX-DCP30** data on a very fine 800-m grid that covers the continental United States (CONUS) for a variety of climate change assessments that require higher resolution data.

The full NEX-DCP30 dataset includes 33 climate models and their respective downscaled data for historical (1950-2005) and 21st century simulations under four Representative Concentration Pathways (RCP) emission scenarios developed for AR5. Our application, the NEX-DCP30 Viewer, includes historical and future (2006-2099) climate for RCP4.5 (one of the possible trajectories for greenhouse gas (GHG) emissions in which atmospheric GHG concentrations continue to rise but are capped so as not to exceed a radiative equivalent of 4.5 Wm⁻² in 2100) and RCP8.5 (the most aggressive emissions scenario in which GHGs continue to rise unchecked through the end of the century leading to an equivalent radiative forcing of 8.5 Wm⁻².)

The NEX-DCP30 Viewer allows the user to visualize projected climate change for any county in the continental United States. To create a manageable number of permutations for the viewer, we have averaged the NEX-DCP30 data into 25-year climatologies that span the 21st century. The viewer provides a number of useful tools for characterizing climate change such as: climographs (plots of monthly averages), histograms that show the distribution or spread of the model simulations, monthly time series spanning 1950-2099, and tables that summarize changes in the quantiles of temperature and precipitation (e.g., extremes). The application also provides access to comprehensive, 3-page PDF summary reports for the CONUS, each states and each county.

A detailed description of the application and its use can be found in the [NEX-DCP30 Viewer Tutorial](#).

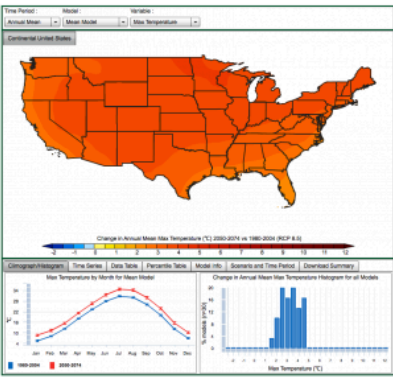
Accessibility



FOIA

Privacy

Policies and Notices

U.S. Department of the Interior | U.S. Geological Survey
URL: http://www.usgs.gov/climate_landuse/clu_rd/nex-dcp30.asp
Page Contact Information: [Website Manager](#)
Page Last Modified: Tuesday, March 18, 2014

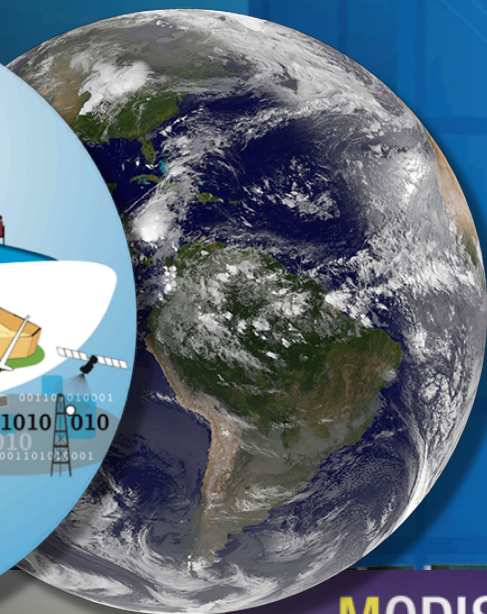
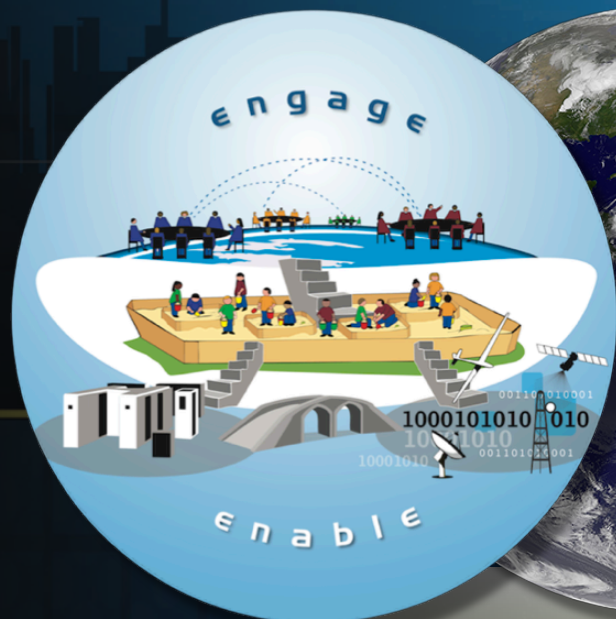




NCA@NEX FY2014 Objectives

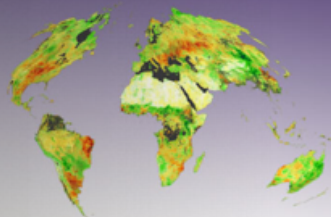
- **Porting NEX Capabilities onto Amazon Web Services (AWS).**
- **Developing In-depth Community Engagement.**
- **Climate Change Assessment with Landsat Data.**

NEX on Amazon Cloud

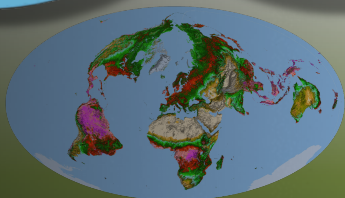


Open Access to Data, Virtual Labs,
Lectures, Computing and More ...

MODIS

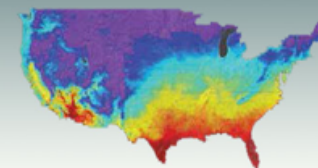


AVHRR



LANDSAT

Data for
Climate
Assessment



OPENNEX

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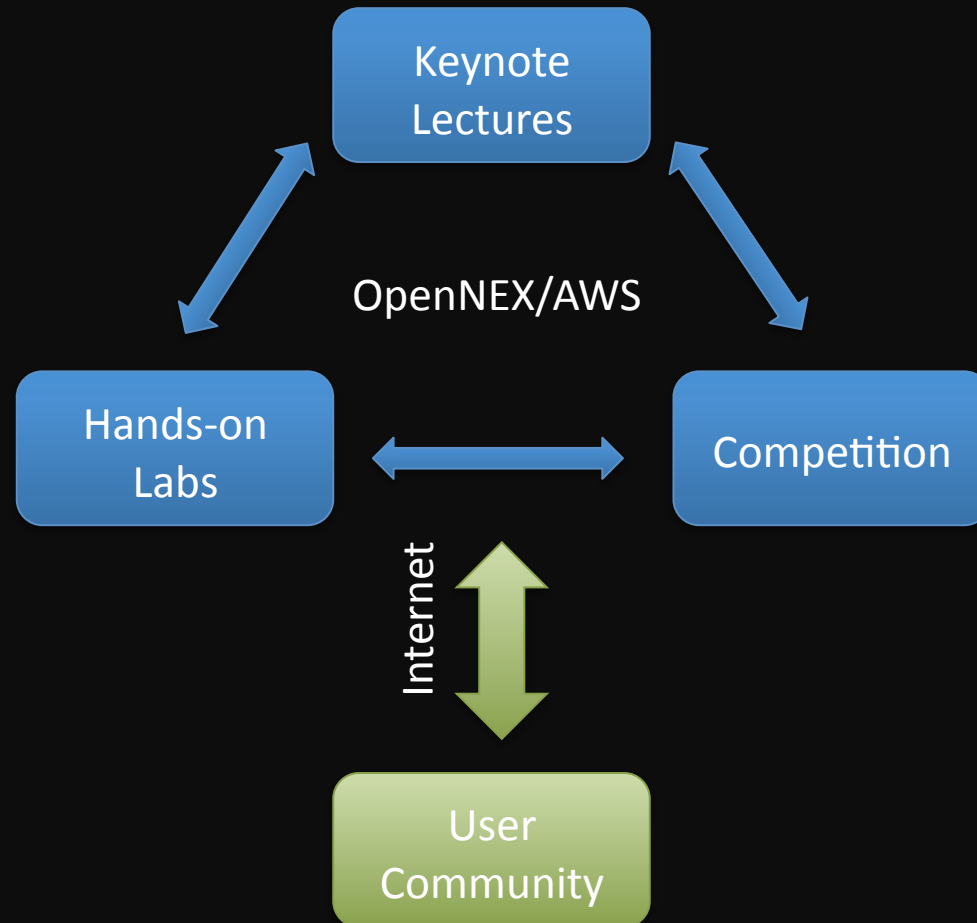
[LABS](#)

[LECTURES](#)



NEX-AWS Collaboration highlighted by OSTP Director, Dr. John Holdren at the White House *Data to Knowledge to Action* event, 11/12/2013

2014 NEX Virtual Workshop (June, 2014) on Climate Change Assessment in US

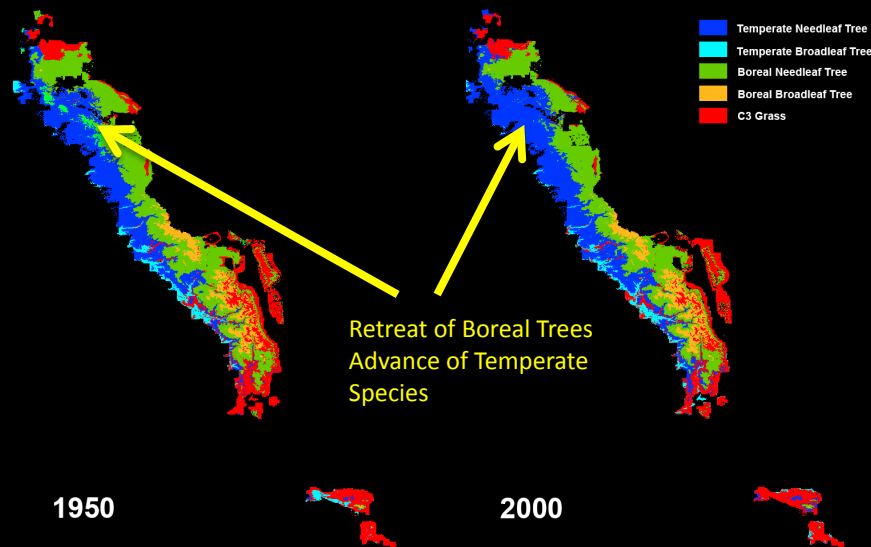


- Deepening collaborations among the NEX/NCA science community
- Engaging a broader audience

Climate and Land-Cover Change Over Nevada Sierra

- Ground-based Observations
- DCP30 Climate Data
- Dynamic Vegetation Model Simulation

What do Satellite Data Show?



FOREST VEGETATION PATTERNS (NO UPDATE)

Sierra Nevada forests species and land cover have been changing since 1934.

Figure 1

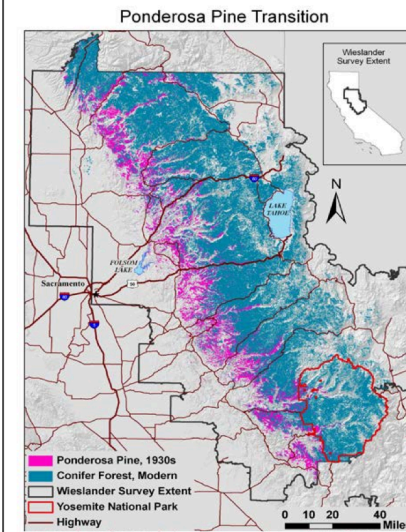
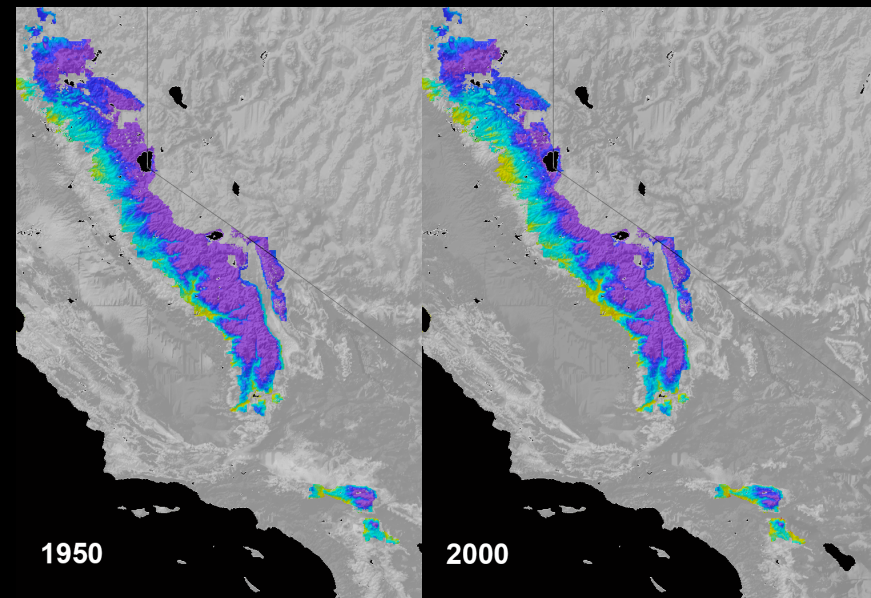
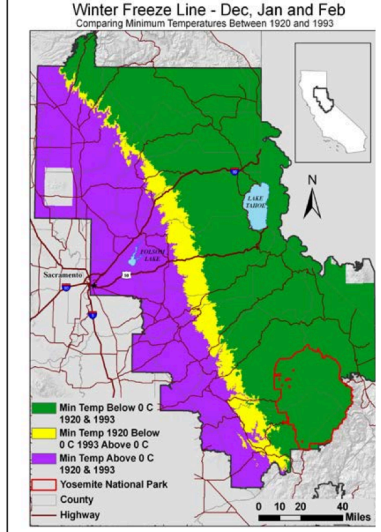
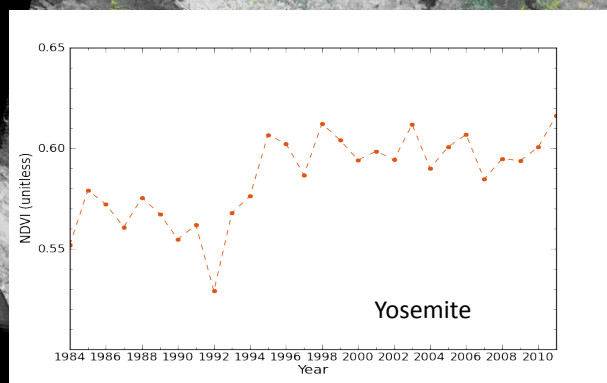
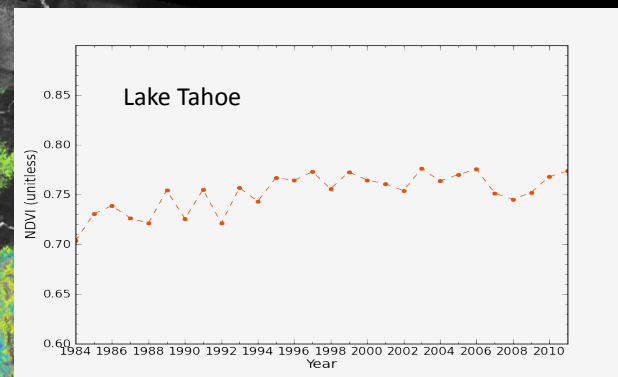


Figure 2



Landsat NDVI Changes from 1984 to 2011



SUMMARY

- **Created/compiled ~100 TB of scientific data and installed a dozen of scientific models and analysis tools on NEX;**
- **Engaged and provided technical support to >30 research teams ;**
- **Published ~30 papers on peer-reviewed research journals;**
- **Developing the OpenNEX platform through collaborations with Amazon Web Services to bring the NEX capability to a broader audience;**
- **Organizing the NEX 2014 virtual workshop to deepen and broaden engagement with the science community as well as the general public;**
- **Analyzing Landsat data over Sierra Nevada to assess ecological impacts of climate changes in these regions.**